Chapter 7
Elevators

7-1. General

Principal considerations relative to powerhouse elevators include justification, location, size, type, and operating characteristics. Design criteria are available in Corps of Engineers Guide Specification CW-14210 and industry standards ASME A17.1 and A17.2.

7-2. Justification

a. General. The justification for powerhouse elevators rests on a number of interrelated factors, the combination of which can indicate a clear requirement, no requirement, or be equivocal. Many existing powerhouses are satisfactory without elevators, and rather definite justification should be apparent to warrant including one or more in the powerhouse design.

b. Principal factors.

(1) Powerhouse location. Powerhouses forming a portion of the dam invariably have considerable foot traffic between the intake deck and powerhouse levels, and the vertical distances are considerable. Such powerhouse locations usually justify one or more elevators.

(2) Number of units. The number of main units is not directly related to elevator requirements, but conventional-type powerhouses with six or more main units will have maintenance schedules and repair requirements requiring considerable interlevel foot traffic and also be subject to heavy interlevel foot traffic during installation. Such traffic normally justifies one or more elevators.

(3) Number of operating levels. Three or less operating levels with total vertical distance of 12 m (40 ft) or less will seldom justify an elevator. When the importance of various operating levels is assessed, the type and amount of foot traffic should be considered. For example, a drainage gallery with seldom operated valves requiring little foot traffic and infrequent tool movements would not require elevator service. A maintenance shop and tool room located above or below the erection and principal maintenance level could require a great deal of up and down movement of personnel, tools, and equipment and could be a strong factor in justifying an elevator.

(4) Visitors. Where visitors are to be permitted and their entry to, or movements within, the powerhouse involve more than a single level, access for the handicapped may well override all other elevator justification factors and dictate an elevator.

(5) Portable equipment movement. Movement of portable equipment such as an oil purifier or floor crane should not normally be used as justification for an elevator as it will usually be more economical to provide duplicate equipment. Where an elevator is otherwise justified, the movement of portable equipment should be considered in sizing and locating the elevator. Design memoranda should include the factors considered in the decision for or against provision of an elevator.

7-3. Location

Elevator location should be considered early in the general powerhouse layout to provide the best access to the control room, locker and rest rooms, maintenance shop, erection bay work level, and where applicable, external decks. A common location is in or near the upstream wall of the main generator-turbine room in the erection bay. Where a second elevator is justified in a long powerhouse for operation and maintenance purposes, the second elevator is usually located to minimize as much as practicable the distance from all points in the powerhouse to the closest elevator.

7-4. Size

a. Small powerhouse. For small powerhouses with service requirements limited to operators and maintenance personnel, a 5,340-N (1,200-lb_f) elevator approximately 1.5 × 1.2 m (5 × 4 ft) is usually adequate. Should the elevator be justified on the basis of visitors, the size and capacity should be increased as required to accommodate the projected visitor traffic.

b. Large powerhouse. Large powerhouses (6 or more main units) with service limited to operators and maintenance personnel will usually be adequately served with a 11-kN (2,500-lb_f) elevator approximately 2.1 × 1.5 m (7 × 5 ft). A powerhouse with a construction schedule requiring joint use of the elevator by project personnel and contractor personnel should be provided with up to a 18-kN (4,000-lb_f) elevator with proportionately larger dimensions. In the case of very large powerhouses (12-20 units) with powerhouse elevator service to the intake deck and extended joint construction-operation usage, it may be justified to provide two elevators in the erection bay area to reduce waiting time. Joint visitor-construction elevator service is usually impractical and should not enter into elevator sizing.

c. Standard size. In all cases the size selected should be a standard size and capacity from the elevator manufacturers.

7-5. Type

Elevators should be basically the passenger type for conventional powerhouses. Freight or combination freight-passenger types may be required where powerhouse areas are planned for warehousing or when needed for the maintenance shop. Finish and appointments should be appropriate to the architecture of the levels served.

7-6. Speed

Operating speeds in the 0.5-0.8-m/s (100-150-fpm) range are adequate for elevators not carrying traffic to or from an intake deck level. Elevators serving the intake deck level and with potential for heavy construction or visitor traffic may be up to 1.3 m/s (250 fpm).

7-7. Control

Selective-collective control is justified for most powerhouse elevators with visitor or extended construction usage. Nonselective-collective automatic control is satisfactory for other installations. Alternate manual control may be justified where heavy visitor traffic is projected. Door opening should be automatic.

7-8. Design

Design of elevators and appurtenances should be a contractor responsibility and be in accordance with applicable provisions of Guide Specification CW-14210 and codes referenced therein. Powerhouse mechanical design sections should perform required studies, coordinate architectural, structural, and electrical requirements, and prepare contract drawings and specifications in accordance with instructions included with CW-14210.

7-9. Procurement

Procurement is normally under the powerhouse construction contract.